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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/912,495	07/24/2001	Steve Chauayem	5049	6265

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APPLIED MATERIALS, INC.
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EXAMINER

MECKS, TIMOTHY HOWARD

ART UNIT PAPER NUMBER

1762

DATE MAILED: 12/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	09/912,495		GHANAYEM ET AL.	
	Examiner		Art Unit	
	Timothy H. Meeks		1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 October 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 16-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 16-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
 a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>1003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Application Status

The amendment filed on 01 October 2003 in response to the Office Action mailed on 01 April 2003 has been fully considered. Claims 15 and 22-27 were canceled. Claims 1-14 and 16-21 are pending as amended.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 is confusing in view of claim 1. For example, how can a dry ambient be used when claim 1 requires a wet ambient produced by an in situ reaction between hydrogen and oxygen? Claim 6 does not otherwise appear to further limit claim 1 if the contradictions to claim 1 are removed.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground

provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-11 and 16-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 6,177,344 in view of Xia et al. (J. Electrochem. Soc.). The claims of '344 differ from the instant claims in that they do not explicitly disclose a ramp rate from the first temperature to the second. However, the ramp rate from the first temperature to the second temperature is a process consideration affecting such variables as overall process time, etc., and it would have been obvious to adjust this result effective parameter through routine experimentation for optimization of the process, especially absent evidence showing a criticality for the claimed ramp rate. The claims of '344 do not explicitly disclose use of a rapid thermal processing chamber. However, because Xia et al. disclose that either a conventional furnace or a rapid thermal processor (RTP) can be used for reflowing BPSG films having the claimed boron and phosphorus concentrations (abstract, experimental), it would have been obvious to have used an RTP to reflow the BPSG layer with a reasonable expectation of such chamber being operable for performing the reflow.

Claims 12-14 and 21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 of U.S. Patent No. 6,177,344 in view of Xia et al. (J. Electrochem. Soc.) and EP 843348 (EP '348).

The claims of '344 further differ from claims 12-14 and 21 in that deposition of a USG layer on the doped layer is not disclosed. However, given the advantages disclosed at page 32,

lines 8-20 for depositing a USG capping layer on a doped silicon layer, it would have been obvious to have deposited a USG capping layer on the BPSG layer to achieve these advantages.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-11 and 16-20 are rejected under 35 U.S.C. 103(a) as being obvious over Xia et al. (6,177,344).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the

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claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(1)(1) and § 706.02(1)(2).

Xia et al disclose formation of a BPSG layer having the claimed boron and phosphorus concentrations, formation of a USG capping layer, and reflowing the layer (col. 6, lines 6-55 and col. 5, lines 1-17). In the embodiment where RTP is used for reflowing, an atmosphere of wet oxygen is introduced instead of hydrogen for formation of a wet atmosphere. However, because it is disclosed at col. 5 lines 1-17 that introducing hydrogen in a chamber containing oxygen is effective for forming a wet atmosphere for reflowing by reaction of the hydrogen and oxygen, it would have been obvious to have generated the wet atmosphere required for reflowing in this manner in the RTP process as doing so would be expected to be operable for providing the wet atmosphere.

The ramp rate range of 50 to 100 °C per minute is slightly higher than the claimed range of 20 to 40 °C per minute. However, use of ramp rates in the claimed range would have been obvious for the reasons established in the above rejection.

Claims 12-14 and 21 are rejected under 35 U.S.C. 103(a) as being obvious over Xia et al (6,177,344) in view of EP 843348 (EP '348).

Xia is applied as above. Xia does not explicitly disclose depositing a USG layer on the BPSG layer. Deposition of the USG layer on the BPSG layer would have been obvious in view of EP '348 for the reasons established above.

Claims 1-14 and 16-21 are rejected under 35 U.S.C. 103(a) as being obvious over EP 843348 (EP '348) in view of Xia et al. (J. Electrochem. Soc.).

EP '348 discloses formation of a BPSG layer with the claimed concentrations of boron and phosphorus and under the claimed deposition conditions at page 30, line 50 to page 31, line 30. Formation of a USG capping layer is described at page 32, lines 8-19. The BPSG layer is reflowed by heating to a temperature of 750 to 950 °C from a deposition temperature of 550 to 650°C and a multi-step reflow wherein the temperature is ramped to an intermediate temperature and then to the reflow temperature is also disclosed (page 33, lines 35-52).

EP '348 is silent as to the ramp rate to use. However, use of ramp rates in the claimed range would have been obvious for the reasons set forth above.

EP '348 does not explicitly disclose reflowing in an RTP chamber in a steam atmosphere formed by reaction of hydrogen and oxygen. However, because Xia discloses in the abstract and experimental that both conventional furnaces and RTP chambers are effective for reflowing BPSG layers and at page 1886 that reflowing in a steam ambient provides better results than other reflowing atmospheres, it would have been obvious to perform the reflowing in a steam atmosphere in an RTP chamber because doing so would be expected to be operable for reflowing the BPSG layer and provide better results than reflowing in other atmospheres.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO

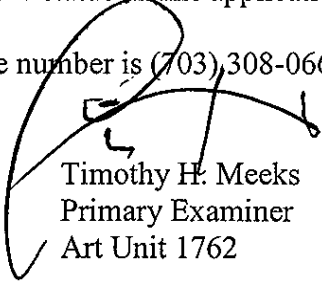
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MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy H. Meeks whose telephone number is (703) 308-3816. The examiner can normally be reached on Mon., Tues., Thurs.(6-6:30), Fri.(6:30-10:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive P. Beck can be reached on (703) 308-2333. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Timothy H. Meeks
Primary Examiner
Art Unit 1762